motion—the arm and leg being rapidly flexed and extended, and in addition the fingers and toes contracting spasmodically on any object presented to them, and drawing it powerfully toward trunk; reflex movements also were active on this side. The pulse had become regular in rhythm, but is running 145 in the minute, small and very quick; heart-sounds devoid of muscular element; respirations 34 in minute, lungs expanding imperfectly, with abundant dry and moist râles. There has again been a bloody discharge from the right ear through the night, but it has ceased. There is no ecchymosis about right side of head. Neither epistaxis nor bloody discharge from the mouth has been present. Deglutition is now impossible. There is frequent suffocative cough with evident accumulation of mucus, but entire inability to expectorate. Death occurred at 8½ A. M., 12 hours after injury.

Post-mortem six hours after death.—The boy has been of a delicate, scrofulous nature, with slight development of the osseous system. Upon reflecting a flap of the scalp, one or two small ecchymoses were seen on the pericranium over the upper part of squamous portion of the right temporal bone, with a considerable apoplexy of the right temporal muscle. A fissured fracture of the right temporal bone was found running through the tympanum into the mastoid process, and forward and upward through the squamous portion, and internally the fracture extended through the petrous portion of the bone. The arteria meningea media was lacerated, and a very large clot of blood effused *upon* the dura mater over lateral and superior face of anterior and middle lobes, and extending round orbital plate of frontal bone, involving right optic nerve. Under seat of clot there was slight subarachnoid hemorrhage. The brain substance was not much congested; the membranes were congested, but showed no sign of meningitis. No effusion at base or into ventricles. The other viscera were healthy, but much congested, especially the lungs, which were also surrounded by about Oss of serum on either side.

Nov. 8. Gunshot Wound; Ball passing through Thyroid Gland, opening Œsophagus, perforating Vertebral Body, and lodging in Substance of the Spinal Cord; Paraplegia; Inability to Swallow; Death in 25¾ hours.—Dr. WM. PEPPER read the following history: Edward Thomas, æt. 22, a returned soldier, was admitted to Surgical Ward of Pennsylvania Hospital, at 11 A. M., Oct. 30, 1865. The preceding evening, at 8 o'clock, whilst in a drunken quarrel with a younger brother over a pistol, the trigger was accidentally pulled at a moment when the barrel pointed towards his throat. The ball, after grazing the chin to the left of the median line, entered about 1½ inch above clavicle, and 1 inch to left of median line of the thyroid cartilage, with a direction from above downwards and from left to right. He fell to the ground immediately, and upon his attempting to rise it was found that he was completely paralyzed below the arms. There was *profuse* hemorrhage from the wound, and, in addition, it was noticed that everything taken into the mouth and swallowed would run out of the opening on the neck. He has been exceedingly restless during the night, and had suffered considerably from dyspnœa.

Upon admission his appearance was peculiar; the eyes wild and restless; features sunken; pupils presented nothing abnormal. There was a superficial wound upon the nose from his fall. The wound of entrance of the ball was small, irregular, and discoloured; and the tissues surrounding it, and around to the back of the neck were œdematous and emphysematous.

On attempting to swallow any fluid, the larger part of it escaped through the opening on the neck. There was marked œdema of the posterior wall of the pharynx, and frequent collections of serum and mucus which he was unable to expectorate, but which, after it had accumulated to a considerable degree, would be expelled to a distance of several feet by a powerful spasmodic action of the diaphragm. The pulse was almost imperceptible, the cardiac impulse nearly extinguished, and the heart sounds changed, the muscular element being almost absent; the valvular sounds very weak, so that the chief thing heard seemed to be a prolonged gentle rush of blood through the cardiac orifices, unattended by murmur. The respirations were irregular—not very rapid—but entirely diaphragmatic, the motions of elevation and expansion being apparently absent. Soon after admission he was obliged to be propped up in a sitting posture, as symptoms of suffocation came on in the recumbent position. On examining more closely the paralysis above referred to, it was found to affect the entire body from the upper edge of the third rib downwards, both as to sensation and motion; from the third to the sixth rib, however, in a circle around the trunk, there was still slight sensibility remaining; thus a needle stuck deeply into the derm within these limits, and moved so as to lacerate it a little, excited a sensation of its presence, but no pain; the reflex movements in this part were also feeble. Below the line of the sixth rib, however, there was not the slightest power either of sensation or motion. The bladder was entirely paralyzed, as were the rectum and its sphincter, for enemata flowed away immediately. The movements of the head, eyes, and tongue were good, and sensation remained unimpaired. The movement of the arms also remained, but their force was less than normal; their sensibility seemed good. Reflex movements could scarcely be roused in the legs at all; the most irritating tickling producing merely a twitch which was scarcely visible. The electro-muscular sensibility was gone in the paralyzed parts, and the electro-muscular contractility much impaired. The temperature was about normal. He complained constantly of pain about head and neck, especially severe about the nucha; this pain he described as being at times of a burning, tingling character. There was a little meteorism, which increased somewhat towards evening. One grain of sulphate of morphia was given by hypodermic injection, and had the effect of somewhat easing the pain. As night came on he became slightly delirious; tore his hair; pushed everything from him, and evinced great restlessness. The respirations became steadily weaker and more irregular; the pulse could not be detected at times; and he died, Oct. 30, 1865, at 9¾ P. M., 25¾ hours after reception of the injury.

The copious hemorrhage, the direction of the ball, the escape of fluids through the wound, and the immediate occurrence of paralysis readily led to the conclusion that the ball had penetrated either the internal jugular vein or thyroid body, had opened the œsophagus, and then entered the spinal cord, cutting the cord about the third dorsal vertebra.

Post-mortem examination, thirteen hours after death.—Brain not examined. Upon reflecting flaps of skin from middle line of the neck, and raising the muscular layers connected with sternum, thyroid cartilage, and hyoid bone (through which the track of the ball could be easily traced), the thyroid gland was exposed. This body was rather larger than is usual at his age, and was perforated by the bullet through its left lobe, close to the thyroid cartilage, and rather above the middle of the gland. The sheath of the carotid artery and accompanying structures was unopened, and the descendens noni nerve intact. Upon raising the gland, the œsophagus was found to have been cut open at the left side, the ball not having fairly entered it, but merely cutting a piece out of the side. There had already been considerable formation of pus, which had burrowed up the sheaths of the muscles of the neck, and had followed the œsophagus down as far as the *diaphragm*. The ball next had entered the body of the first dorsal vertebra on the left side and about its middle; traversed the body and the cartilage below; entered the body of the second dorsal, in its course from above downwards and from left to right; entered the spinal canal at a point half-way down this latter vertebra and to the right of the median line, and buried itself in the substance of the right anterior and middle columns of the cord. There was a small amount of hemorrhage into the sheath of the spinal dura mater, but not sufficient to cause any marked compression. No distinct meningitis had occurred, but there was œdema of the connective tissue outside the spinal cord. The brachial plexuses were apparently uninjured. The œdema and ecchymosis along the anterior surface of the spinal column prevented any dissection of the left sympathetic nerve.

The *lungs* were deeply congested posteriorly, some passive hydrothorax on each side.

The *heart* was flaccid, distended with blood in all its cavities.

The *spleen* was double the normal size, and quite too soft.

The *liver* moderately congested; there was no evidence that he had suffered from malarial fever, although in all probability exposed to its causes in the army.

The *stomach* was distended with gas; contained some little gastric juice with numerous pieces of meat which were quite firm, and scarcely at all digested. The kidneys were intensely congested.

The ball was a round one, about one-fifth inch in diameter, and, despite its long course through the tissues, had not been much flattened.

Cases of injury to the spinal cord, more or less similar to this one, are to be found recorded in many works; but their number can never destroy the interest attaching to them as illustrations of the principles of the pathological physiology of this portion of the nervous system. Among the questions, then, presenting themselves in connection with the case just read, is that of the proportion which the shock of the injury bore in the production of the hemiplegia. There is, perhaps, no idea more strongly suggested in the study of pathological anatomy than the tolerance of the system to many chronic diseases, the extraordinary persistence of function in organs whose entire structure has become changed by gradual morbid action. This statement, so true with regard to the abdominal and thoracic viscera, is sustained in the study of the pathology of the spinal cord by cases where the lesion has amounted to an almost complete solution of continuity, and yet, in which the function of the cord has remained almost intact. The following extraordinary instance is transcribed from Begin:[1]—

"The patient, who was a vigorous man, and addicted to venereal pleasures, was seized, at the age of 34, with stiffness in his arms, then with difficulty in moving them, and finally, after a fall whilst walking, with contraction of these members carried so far, that the hands were stiff, hooked, and so contorted that their palmar surfaces were directed upwards and backwards. The legs notwithstanding preserved their movements in full force; the sensibility of the whole body remained intact, and frequent erections manifested themselves, so that the patient was for a long time able to have sexual intercourse, the desire for which continued active until a short time before death. After long sufferings the patient died. At the autopsy, a large quantity of serous fluid was found in the spinal arachnoid cavity, and for the extent of six or seven inches comprising the lower two-thirds of the cervical portion and the upper third of the dorsal portion; the spinal cord was so soft that the canal of the dura mater seemed really to be distended by a fluid, which fell and rose according to the angle at which the corpse was held. . . . . On opening the dura mater, this portion of the cord showed an elongated cavity filled with a grayish-red fluid, and traversed by a number of delicate bloodvessels. The cords from which the roots of corresponding spinal nerves take their origin could scarcely be distinguished in the anterior part of this disorganized portion; and on the left side the spinal cord seemed completely destroyed for an inch and a half. . . . . . Examined on its anterior surface, the cord seemed less altered; and the diffluent condition of the nerve matter did not involve the external layer. . . . . This disorganization commenced abruptly below origin of fourth cervical nerves, and extended close to the fourth pair of dorsal nerves. It is worthy of remark that here a layer of medullary matter about two lines thick, and probably altered in structure, was sufficient to keep up communication between superior and inferior extremities of the cord in so perfect a manner, that not only did the legs still obey the will, but the genital organs could be powerfully excited and transmit vivid sensations of pleasure to the brain."

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[1] Traité de Physiologie Pathologique, i. 235.

In recent injuries, however, so far from any such tolerance being established, a contrary state of things is generally noticed; for, although cases occasionally occur where the actual lesion fully explains the paralysis following, as in the case reported by Gross,[1] where the ball from behind entered between the last cervical and first dorsal vertebræ, penetrating and pulpefying the cord, and cutting it in two by projecting across it a fragment from the injured bones, the ball itself being found loose in the vertebral canal. Here the symptoms were, as might be expected, power of motion of arms remaining, but complete paralysis of body and legs, with loss of sensation from near the top of the sternum to the soles of the feet. The pulse was slow, and respiration heavy and laborious. The bowels were costive; and the bladder had to be relieved by catheter (life was prolonged in this case three and a half days). But it generally happens that fibres of the cord which do not suffer actual physical disorganization, lose their power of transmitting impressions, whether from compression by the effused blood, or from the shock of the injury. In the present case the ball entered the dura mater to the right of the median line, and buried itself in the right anterior and lateral column of the cord, producing but little hemorrhage into the canal of the dura mater. The amount of compression exercised upon the rest of the cord was not apparently such as to entirely occlude it, nor was there much pulpefying of the left columns of the cord, and yet from the first instant there was complete paralysis of motion and sensation in the trunk and legs, together with a marked decrease in activity of reflex actions in the part paralyzed.

Is it not possible in those cases where the system reacts, as in primary attacks of apoplexy, that the slow reappearance of power in parts at first completely paralyzed, may be due to the gradual subsidence of the shock which the adjacent nervous tissue has received.

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[1] System of Surgery, vol. ii. p. 306.

A second point of some interest in connection with this case is the explanation of the slight sensibility and power of movement which remained in the parts situated between the line of fracture, and the upper part of the sixth rib. Bearing in mind that the brachial plexus was uninjured, this absence of paralysis may be traced to three sources: " 1st, the intercostal branch of the anterior division of the first dorsal nerve, nearly all of which enters into the brachial plexus; 2d, the anterior thoracic nerves, the external or superficial arising from the outer cord of the brachial plexus (formed from fifth and seventh cervical), and distributed to the under surface of the pectoralis major, while the internal or deep branch arises from the inner cord of the brachial plexus (formed from the eighth cervical and first dorsal nerves), and is also distributed to under surface of pectoralis major and minor muscles; and 3d, the middle or clavicular branch of the cervical plexus (from the third and fourth cervical nerves), which crosses the clavicle and supplies integument over pectoral and deltoid muscles, communicating with cutaneous branches of upper intercostal nerves.

From the point at which the ball struck the left side of the body of the vertebra, it is not probable that any filaments of the left sympathetic were cut, so that the character of the heart sounds, the paralysis of the stomach as shown by the undigested fragments of meat, the paralysis of the bladder and of the rectum afford a complete demonstration of the important motor action of the spinal filaments of the sympathetic nerve.

As regards the prolongation of life after injuries of the spinal cord, perhaps the most important question is as to the implication of the phrenic nerves. Where the nerves are completely paralyzed, or in other words, when the compression or laceration is seated at or above the third cervical nerve, life is not prolonged much beyond twenty-four hours. But when these nerves are not involved in the injury, life may be prolonged to a much greater extent; so that perhaps the average duration of life after injuries involving the entire cord just below the origin of the brachial plexus, may be stated as from eighteen to twenty-four days. In the present case, the inability of the patient to receive stimulants, the free hemorrhage from the thyroid gland, the great œdema of the pharynx and adjacent parts, afford a full explanation of his death in so short a period as twenty-four hours.

Nov. 14th. Medullary Cancer.—Dr. S. W. Mitchell, on behalf of Dr. **Peale**, of Holmesburg, Pa., presented the specimen, and read the following notes of the case from which it was derived.

Mrs. McDaniels, æt. 47, first felt a soreness at the junction of upper with middle third of the rectus femoris muscle of each thigh. This soreness soon got well on the right leg, but on the left continued, and gradually became a small lump (as she described it), forming a tumour the size of the fist by the expiration of about three months, which was August 20, 1864, at which time she was obliged to remain in bed, owing to the pain in the limb, and she has continued there up to this date, Feb. 2, 1865. The tumour is now situated over most of the upper and middle thirds of the anterior portion of the thigh, covering a space as nearly as can be estimated by external examination, of about 9 inches long, beginning 1½ inch below Poupart's ligament, and apparently about 5 inches wide, and projecting from the bone 3½ inches.

There is an obscure sensation of fluctuation over a surface about 3½